

Amendments to the claims:

Cancel claims 1, 2, 3, 4, 5, 15 and 25.

Claims 6, 16 and 16 are amended.

New claims 44-52 are added.

1.- 5. (Cancelled)

1 6. (Currently Amended) ~~A spin valve transistor as claimed in claim 4 wherein~~ A spin
2 valve transistor comprising:
3 an emitter;
4 a collector;
5 a base between the emitter and the collector;
6 a spin valve including:
7 a ferromagnetic free layer structure;
8 a self-pinned antiparallel (AP) pinned layer structure without any pinning structure
9 pinning the self-pinned AP pinned layer structure; and
10 a nonmagnetic spacer layer between the free layer structure and the AP pinned layer
11 structure; and
12 the base comprising at least said free layer structure;
13 the self pinned AP pinned layer structure comprising:
14 a ferromagnetic first antiparallel (AP) pinned layer;
15 a ferromagnetic second antiparallel (AP) pinned layer;
16 a nonmagnetic antiparallel coupling (APC) layer located between the first and
17 second AP pinned layers;
18 one of the first and second AP pinned layers having a cobalt iron (CoFe) film with
19 a positive magnetostriction;
20 the CoFe film having a magnetostrictive anisotropy field that is oriented
21 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned
22 layer structure; and
23 the first and second AP pinned layers ~~[[have]]~~ having the same magnetic thickness.

1 7. (Previously Presented) A spin valve transistor comprising:
2 an emitter;
3 a collector;
4 a base between the emitter and the collector;
5 a spin valve including:
6 a ferromagnetic free layer structure composed of iron (Fe);
7 a self-pinned antiparallel (AP) pinned layer structure;
8 a nonmagnetic spacer layer between the free layer structure and the AP pinned layer
9 structure; and
10 the free layer structure interfacing the spacer layer;
11 the base comprising at least said free layer structure;
12 the self pinned AP pinned layer structure including:
13 a ferromagnetic first antiparallel (AP) pinned layer;
14 a ferromagnetic second antiparallel (AP) pinned layer; and
15 a nonmagnetic antiparallel coupling (APC) layer located between the first and
16 second AP pinned layers;
17 the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;
18 the second AP pinned layer including:
19 an iron (Fe) film;
20 a cobalt iron (CoFe) film with a positive magnetostriction;
21 the iron (Fe) film being located between and interfacing the APC layer and the
22 cobalt iron (CoFe) film; and
23 the CoFe film having a magnetostrictive anisotropy field that is oriented
24 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned
25 layer structure.

1 8. (Original) A spin valve transistor as claimed in claim 7 wherein the cobalt iron
2 is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 9. (Previously Presented) A spin valve transistor as claimed in claim 7 wherein the
2 cobalt iron (CoFe) film is $\text{Co}_{50}\text{Fe}_{50}$.

1 10. (Original) A spin valve transistor as claimed in claim 9 wherein the first and
2 second AP pinned layers have the same magnetic thickness.

1 11. (Withdrawn) A spin valve transistor as claimed in claim 4 further comprising:
2 the second AP pinned layer being composed of iron (Fe);
3 the first AP pinned layer including:
4 first and second iron (Fe) films with the first iron (Fe) film interfacing the spacer
5 layer;
6 said cobalt iron (CoFe) film; and
7 the cobalt iron (CoFe) film being located between and interfacing the first and
8 second iron (Fe) films.

1 12. (Withdrawn) A spin valve transistor as claimed in claim 11 wherein the cobalt
2 iron film is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 13. (Withdrawn) A spin valve transistor as claimed in claim 12 wherein the cobalt
2 iron film is $\text{Co}_{50}\text{Fe}_{50}$.

1 14. (Withdrawn) A spin valve transistor as claimed in claim 13 wherein the first and
2 second AP pinned layers have the same magnetic thickness.

15. (Cancelled)

1 16. (Currently Amended) ~~A magnetic head assembly as claimed in claim 15 wherein~~
2 A magnetic head assembly comprising:
3 a write head;
4 a read head adjacent the write head;
5 the read head including:
6 ferromagnetic first and second shield layers; and
7 a spin valve transistor located between the first and second shield layers;

8 the spin valve transistor comprising:

9 an emitter;

10 a collector;

11 a base between the emitter and the collector;

12 a spin valve including:

13 a ferromagnetic free layer structure;

14 a self-pinned antiparallel (AP) pinned layer structure without any pinning
15 structure pinning the self-pinned AP pinned layer structure;

16 a nonmagnetic spacer layer between the free layer structure and the AP
17 pinned layer structure; and

18 the base comprising at least said free layer structure;

19 the self pinned AP pinned layer structure ~~comprises:~~ comprising:

20 a ferromagnetic first antiparallel (AP) pinned layer;

21 a ferromagnetic second antiparallel (AP) pinned layer;

22 a nonmagnetic antiparallel coupling (APC) layer located between the first and
23 second AP pinned layers;

24 one of the first and second AP pinned layers having a cobalt iron (CoFe) film with
25 a positive magnetostriction; [[and]]

26 the CoFe film having a magnetostrictive anisotropy field that is oriented
27 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned
28 layer structure[.]; and

29 the first and second AP pinned layers having the same magnetic thickness.

1 17. (Previously Presented) A magnetic head assembly comprising:

2 a write head;

3 a read head adjacent the write head;

4 the read head including:

5 ferromagnetic first and second shield layers; and

6 a spin valve transistor located between the first and second shield layers;

7 the spin valve transistor comprising:

8 an emitter;

9 a collector;

10 a base between the emitter and the collector;

11 a spin valve including:
 12 a ferromagnetic free layer structure composed of iron (Fe);
 13 a self-pinned antiparallel (AP) pinned layer structure;
 14 a nonmagnetic spacer layer between the free layer structure and the AP
 15 pinned layer structure; and
 16 the free layer structure interfacing the spacer layer;
 17 the base comprising at least said free layer structure;
 18 the self pinned AP pinned layer structure including:
 19 a ferromagnetic first antiparallel (AP) pinned layer;
 20 a ferromagnetic second antiparallel (AP) pinned layer; and
 21 a nonmagnetic antiparallel coupling (APC) layer located between the first and
 22 second AP pinned layers;
 23 the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;
 24 the second AP pinned layer including:
 25 an iron (Fe) film;
 26 a cobalt iron (CoFe) film with a positive magnetostriction;
 27 the iron (Fe) film being located between and interfacing the APC layer and the
 28 cobalt iron (CoFe) film; and
 29 the CoFe film having a magnetostrictive anisotropy field that is oriented
 30 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned
 31 layer structure.

1 18. (Previously Presented) A magnetic head assembly as claimed in claim 17 wherein
 2 the cobalt iron is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 19. (Previously Presented) A magnetic head assembly as claimed in claim 17 wherein
 2 the cobalt iron is $\text{Co}_{50}\text{Fe}_{50}$.

1 20. (Original) A magnetic head assembly as claimed in claim 19 wherein the first
 2 and second AP pinned layers have the same magnetic thickness.

1 21. (Withdrawn) A magnetic head assembly as claimed in claim 16 further
2 comprising:

3 the second AP pinned layer being composed of iron (Fe);

4 the first AP pinned layer including:

5 first and second iron (Fe) films with the first iron (Fe) film interfacing the spacer
6 layer;

7 said cobalt iron (CoFe) film; and

8 the cobalt iron (CoFe) film being located between and interfacing the first and
9 second iron (Fe) film.

1 22. (Withdrawn) A magnetic head assembly as claimed in claim 21 wherein the
2 cobalt iron film is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 23. (Withdrawn) A magnetic head assembly as claimed in claim 22 wherein the cobalt
2 iron film is $\text{Co}_{50}\text{Fe}_{50}$.

1 24. (Withdrawn) A magnetic head assembly as claimed in claim 23 wherein the first
2 and second AP pinned layers have the same magnetic thickness.

25. (Cancelled)

1 26. (Currently Amended) ~~A magnetic disk drive as claimed in claim 25 wherein A~~
2 magnetic disk drive comprising:

3 at least one magnetic head assembly that has a head surface;

4 the magnetic head assembly having a write head and a read head;

5 the read head including:

6 ferromagnetic first and second shield layers; and

7 a spin valve transistor located between the first and second shield layers;

8 the spin valve transistor comprising:

9 an emitter;

10 a collector;

11 a base between the emitter and the collector;

12 a spin valve including:
13 a ferromagnetic free layer structure;
14 a self-pinned antiparallel (AP) pinned layer structure without any pinning structure
15 pinning the self-pinned AP pinned layer structure;
16 a nonmagnetic spacer layer between the free layer structure and the AP pinned layer
17 structure; and
18 the base comprising at least said free layer structure;
19 the self pinned AP pinned layer structure ~~comprises:~~ comprising:
20 a ferromagnetic first antiparallel (AP) pinned layer;
21 a ferromagnetic second antiparallel (AP) pinned layer;
22 a nonmagnetic antiparallel coupling (APC) layer located between the first and
23 second AP pinned layers;
24 one of the first and second AP pinned layers having a cobalt iron (CoFe) film with
25 a positive magnetostriction; ~~[[and]]~~
26 the CoFe film having a magnetostrictive anisotropy field that is oriented
27 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned
28 layer structure~~[[.]]~~; and
29 the first and second AP pinned layers having the same magnetic thickness;
30 a housing;
31 a magnetic medium supported in the housing;
32 a support mounted in the housing for supporting the magnetic head assembly with said head
33 surface facing the magnetic medium so that the magnetic head assembly is in a transducing
34 relationship with the magnetic medium;
35 a motor for moving the magnetic medium; and
36 a processor connected to the magnetic head assembly and to the motor for exchanging
37 signals with the magnetic head assembly and for controlling movement of the magnetic medium.

1 27. (Previously Presented) A magnetic disk drive comprising:
2 at least one magnetic head assembly that has a head surface;
3 the magnetic head assembly having a write head and a read head;
4 the read head including:
5 ferromagnetic first and second shield layers; and
6 a spin valve transistor located between the first and second shield layers;

the spin valve transistor comprising:

- an emitter;
- a collector;
- a base between the emitter and the collector;

a spin valve including:

- a ferromagnetic free layer structure composed of iron (Fe);
- a self-pinned antiparallel (AP) pinned layer structure;
- a nonmagnetic spacer layer between the free layer structure and the AP pinned layer structure; and

the free layer structure interfacing the spacer layer;

the base comprising at least said free layer structure;

the self pinned AP pinned layer structure including:

- a ferromagnetic first antiparallel (AP) pinned layer;
- a ferromagnetic second antiparallel (AP) pinned layer; and
- a nonmagnetic antiparallel coupling (APC) layer located between the first and second AP pinned layers;

the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;

the second AP pinned layer including:

- an iron (Fe) film with a positive magnetostriction;
- a cobalt iron (CoFe) film;
- the iron (Fe) film being located between and interfacing the APC layer and the cobalt iron (CoFe) film; and

the CoFe film having a magnetostrictive anisotropy field that is oriented perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned layer structure;

a housing;

a magnetic medium supported in the housing;

a support mounted in the housing for supporting the magnetic head assembly with said head surface facing the magnetic medium so that the magnetic head assembly is in a transducing relationship with the magnetic medium;

a motor for moving the magnetic medium; and

a processor connected to the magnetic head assembly and to the motor for exchanging signals with the magnetic head assembly and for controlling movement of the magnetic medium.

1 28. (Original) A magnetic disk drive as claimed in claim 27 wherein the cobalt iron
2 is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 29. (Previously Presented) A magnetic disk drive as claimed in claim 27 wherein the
2 cobalt iron is $\text{Co}_{50}\text{Fe}_{50}$.

1 30. (Original) A magnetic disk drive as claimed in claim 29 wherein the first and
2 second AP pinned layers have the same magnetic thickness.

1 31. (Withdrawn) A magnetic disk drive as claimed in claim 26 further comprising:
2 the second AP pinned layer being composed of iron (Fe);
3 the first AP pinned layer including:
4 first and second iron (Fe) films with the first iron (Fe) layer film interfacing the
5 spacer layer;
6 said cobalt iron (CoFe) film; and
7 the cobalt iron (CoFe) film being located between and interfacing the first and
8 second iron (Fe) film.

1 32. (Withdrawn) A magnetic disk drive as claimed in claim 31 wherein the cobalt
2 iron is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 33. (Withdrawn) A magnetic disk drive as claimed in claim 32 wherein the cobalt
2 iron is $\text{Co}_{50}\text{Fe}_{50}$.

1 34. (Withdrawn) A magnetic disk drive as claimed in claim 33 wherein the first and
2 second AP pinned layers have the same magnetic thickness.

1 35. (Previously Presented) A spin valve transistor as claimed in claim 9 wherein the
2 base further comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1 36. (Previously Presented) A spin valve transistor as claimed in claim 35 further
2 comprising a barrier layer located between the emitter and the base for conducting hot electrodes
3 from the emitter to the base wherein the hot electrons have an energy level above Fermi levels of
4 the layers in said base.

1 37. (Previously Presented) A spin valve transistor as claimed in claim 36 wherein
2 the first and second AP pinned layers have the same magnetic thickness.

1 38. (Previously Presented) A magnetic head assembly as claimed in claim 19
2 wherein the base further comprises the self-pinned antiparallel (AP) pinned layer structure and the
3 spacer layer.

1 39. (Previously Presented) A magnetic head assembly as claimed in claim 38 further
2 comprising a barrier layer located between the emitter and the base for conducting hot electrodes
3 from the emitter to the base wherein the hot electrons have an energy level above Fermi levels of
4 the layers in said base.

1 40. (Previously Presented) A magnetic head assembly as claimed in claim 39
2 wherein the first and second AP pinned layers have the same magnetic thickness.

1 41. (Previously Presented) A magnetic disk drive as claimed in claim 29 wherein the
2 base further comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1 42. (Previously Presented) A magnetic disk drive as claimed in claim 41 further
2 comprising a barrier layer located between the emitter and the base for conducting hot electrodes
3 from the emitter to the base wherein the hot electrons have an energy level above Fermi levels of
4 the layers in said base.

1 43. (Previously Presented) A magnetic disk drive as claimed in claim 42 wherein the
2 first and second AP pinned layers have the same magnetic thickness.

1 44. (New) A spin valve transistor as claimed in claim 6 wherein at least one of the
2 AP pinned layers is $\text{Co}_{50}\text{Fe}_{50}$.

1 45. (New) A spin valve transistor as claimed in claim 44 wherein the base further
2 comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1 46. (New) A spin valve transistor as claimed in claim 45 further comprising a barrier
2 layer located between the emitter and the base for conducting hot electrons from the emitter to
3 the base wherein the hot electrons have an energy level above Fermi levels of the layers in said
4 base.

1 47. (New) A magnetic head assembly as claimed in claim 16 wherein at least one of
2 the AP pinned layers is $\text{Co}_{50}\text{Fe}_{50}$.

1 48. (New) A magnetic head assembly as claimed in claim 47 wherein the base further
2 comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1 49. (New) A magnetic head assembly as claimed in claim 48 further comprising a
2 barrier layer located between the emitter and the base for conducting hot electrons from the
3 emitter to the base wherein the hot electrons have an energy level above Fermi levels of the layers
4 in said base.

1 50. (New) A magnetic disk drive as claimed in claim 26 wherein at least one of the
2 AP pinned layers is $\text{Co}_{50}\text{Fe}_{50}$.

1 51. (New) A magnetic disk drive as claimed in claim 50 wherein the base further
2 comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1 52. (New) A magnetic disk drive as claimed in claim 51 further comprising a barrier
2 layer located between the emitter and the base for conducting hot electrons from the emitter to
3 the base wherein the hot electrons have an energy level above Fermi levels of the layers in said
4 base.